

CLAIMS

What is claimed is:

1. A method of operating a system which comprises a pressurized cryogenic storage tank for storing a gaseous fuel in liquid form and which comprises an apparatus that consumes fuel from the storage tank, the method comprising:

(a) storing the fuel in the storage tank in a first two-phase gas and liquid state;

(b) transitioning the fuel in the storage tank from said first two-phase state to a single-phase liquid state by heat influx into the storage tank; and

(c) transitioning the fuel in the storage tank from said single-phase liquid state to a second two-phase gas and liquid state.

2. The method of claim 1, wherein (c) is performed by the apparatus consuming fuel from the storage tank.

3. The method of claim 2, wherein (b) is performed again once the apparatus ceases consuming fuel from the storage tank.

4. The method of claim 2, wherein (b) then (c) then (b) are performed repetitively as the apparatus consumes and ceases to consume fuel from the storage tank.

5. The method of claim 1, wherein (b) further includes controlling a pressure level in the storage tank to increase pressure while the fuel in the storage tank transitions from said first two-phase state to said single-phase state.

6. The method of claim 1, wherein (b) further includes maintaining a quantity of fuel in the storage tank substantially constant while the fuel in the storage tank transitions from said first two-phase state to said single-phase state.

7. The method of claim 1, wherein the storage tank has an outer wall, and a cooling shield inboard of said outer wall and (c) is performed by venting a portion of the liquid fuel from the storage tank in heat transfer relationship with the heat flux in and around the cooling shield.

8. The method of claim 1, wherein (c) further includes maintaining a pressure level in the storage tank substantially constant while transitioning the fuel from said single-phase state to said second two-phase state.

9. The method of claim 1, wherein (c) is performed while the apparatus is not consuming fuel from the storage tank.

10. The method of claim 1, wherein (c) is initiated when a pressure level in the storage tank reaches a predetermined value.

11. The method of claim 1, wherein the apparatus is a mobile platform on which the storage tank is located.

12. The method of claim 11, wherein the mobile platform includes a fuel cell operable to consume the fuel in the storage tank.

13. A method of operating a system which comprises a pressurized cryogenic storage tank for storing hydrogen in liquid form and which has a vent cooling shield and which comprises an apparatus that consumes hydrogen from the storage tank, the method comprising:

(a) adding hydrogen to the storage tank so that the storage tank is filled with hydrogen in a first two-phase gas and liquid state with a liquid level greater than about 95% of a capacity of the storage tank;

(b) transitioning the fuel in the storage tank from the first two-phase gas and liquid state to a first single-phase liquid state; and

(c) transitioning the fuel in the storage tank from the first single-phase liquid state to a second two-phase gas and liquid state.

14. The method of claim 13, wherein (c) is performed by the apparatus consuming hydrogen from the storage tank.

15. The method of claim 14, further comprising ceasing the consumption of hydrogen from the storage tank by the apparatus and allowing the hydrogen in the storage tank to transition from the second two-phase gas and liquid state to a second single-phase liquid state as a result of heat influx into the storage tank.

16. The method of claim 15, further comprising controlling a pressure level in the storage tank to increase pressure while the hydrogen in the storage tank is transitioning from the second two-phase gas and liquid state to the second single-phase liquid state.

17. The method of claim 15, further comprising maintaining a quantity of hydrogen in the storage tank substantially constant while the hydrogen is transitioning from the second two-phase gas and liquid state to the second single-phase liquid state.

18. The method of claim 13, wherein the storage tank has an outer wall, and the cooling shield is inboard of the outer wall and (b) is performed by venting a portion of the liquid hydrogen from the storage tank in heat transfer relationship with heat influx into the storage tank and around the cooling shield.

19. The method of claim 13, wherein (b) further includes maintaining a pressure level in the storage tank substantially constant while transitioning the hydrogen from the first two-phase gas and liquid state to the first single-phase liquid state.

20. The method of claim 13, wherein (b) is performed while the apparatus is not consuming fuel from the storage tank.

21. The method of claim 13, wherein (b) is initiated when a pressure level in the storage tank reaches a predetermined value.

22. The method of claim 13, wherein (a) includes adding hydrogen to the storage tank so that the storage tank is filled with liquid hydrogen to about 100% of said capacity of the storage tank.

23. The method of claim 14, wherein the apparatus is a mobile platform on which the storage tank is located.

24. The method of claim 23, wherein the mobile platform includes a fuel cell operable to consume the hydrogen in the storage tank.